ARCHITECTURAL COMPOSITION

GENERAL PRINCIPLES

By Professor H. Wagner

PROPORTIONS IN ARCHITECTURE

By Professor A. Thiersch

DESIGN OF THE BUILDING

By Professor H. Wagner

TREATMENT OF EXTERNAL AND INTERNAL ARCHITECTURE

By Professor J Bühlmann

ENTRANCES, STAIRS, COURTS, AND HALLS

By Professor H. Wagner

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ARCHITECTURAL COMPOSITION.

PROBLEM AND AIM OF ARCHITECTURAL CREATION.

By Professor Wagner.

1. Primary Ideas.

Every building and work of human creation must serve a definite purpose. For fulfilling this purpose, that building is most suitable, to which an appearance and form are given, suited to the purpose of the building and pleasing to theeye. To understand these requirements more accurately, the primary ideas in Architecture must here be stated.

For the structure to fulfill its aim, it must first accord with the material conditions, which are subject to constant change, for development and refinement of civilization have modified the primitive and simplest requirements of life, continually producing new deeds and new problems in manifold variety. An infinite domain is opened to man's creative impulse; no problem is so minute as to be unworthy his mind, none too great for his grasp. However diverse the conditions, the laws for their treatment are invariable. We obey the eternal rule of nature, evident in its lowest and its highest organisms. For the work of men to completely fulfil its purpose, like the products of nature, each part must fulfil the function assigned to it and take the appropriate form. The entire structure must be a truthful expression of the ideas, that called it into existence.

If the work has an ideal meaning as a worthy monument of human creation and is to endure to future ages, then must it likewise suit the tendency of the human mind toward elevation and perfection, and must appear in graceful and beautiful form.

2. Nature of Architectural Creation.

This gives the requirements that clearly distinguish works in architecture from creations in other arts. Painters and sculptors execute while they conceive and require no assistance from others. Not so with the Architect. For the creative mind is in architecture more intimately connected with the material than in other arts: it is subject to the laws of science, must satisfy conditions of construction, and for the embodying its results, requires combined efforts of many men and expenditure of money not necessary in Painting and Sculpture, still less so in Poetry and Music.

In every branch of knowledge, the judgement chiefly executes the erection of the building by the art of construction. But if this is to become an architectural creation, knowledge of the true must be joined with perception of the beautiful, aided by imagination. It is not sufficient for the creative idea to be clearly and truthfully expressed; it must appear in judicious forms, pleasing to the eye, to be understood. It is not enough for each part to recieve the form best adapted to the requirement assign-

ed to it in the entire organism; this form must at the same time be beautiful. In representing the beautiful, it is primarily essential to invest the exterior of the building with artistic forms, according to the law of the style; art forms are less easily understood and do not act on the feelings so directly, as in the modes of expression of other arts, since they belong to a language to be learned from nature. For most works in architecture, both the appearance of the exterior and that of the interior are to be designed and harmonized; each room and each part of the building must have that effect suited to its purpose. Parts of the structure enclosing space are to be so grouped and divided as to present on all sides a pleasing effect, just as required for works of Sculpture. Local and climatic conditions are to be considered, and affect plan, arrangement, and also treatment of forms.

These can only obtain the consecration of art by regularity in arrangement and harmony of proportions, attaining perfection by appropriate decoration and splendor of color. This requires the power of imagination, not confused by any difficulties, able to grasp the peculiarities of the problem and to deduce therefrom suggestions for characteristic expression. This requires the assistance of Painting and Sculpture, for which Architecture creates locations for effective treatment of their reproductions, in order to bring forth in combination with them the most perfect and most sublime works of the formative arts.

These indicate the paths to be followed by the creative thought in architecture, and the aim to be reached. For architectural composition or design is a condensation of science and knowledge, that experience, science and art required from the creator of the building. It manifests the triad of ideas summarized in fulfilment of purpose, truth of idea, and beauty of form.

3. Two-fold Problem of Architect.

The artistic side is therefore emphatic in designing a building, but is not the sole problem of the architect in architectural composition, his labors not ending with it. If a master of his art in the full sense, his creation only terminates with the completed structure, and to realize this, he must be both master of form and construction. He must be such in conceiving, and still more in completing the design, for the construction is the means of its realization. As constructor, he selects and employs the building materials according to their natural peculiarities and conditions; by the aid of science and experience, he chooses the method and system adapted to the materials; he dimensions parts of the structure in accordance with their loads, and arranges them to best suit their purpose.

Their formal treatment is then by the artist.

Prepared thus and clearly set forth in words and drawings, accurately dimensioned and estimated, the work is ready for execution.

A new series of labors of the architect begins when he is the creator of his work in the fuller sense. Execution and conception in architecture, as in every art are most intimately connected. The designer of the building must give it the stamp of his mind, even its smallest details, and as its overseer, must fill assistants, foremen and workmen with this spirit, to set stone on stone, join member to member, and create a work in which the law of harmony and the unity of design may fully appear. What was devised in an hour of inspiration, and was built up in his mind during long days of contest with external and internal requirements, demands months and years of continuous labor, the work of skillful hands under the architect's guidance, and he must aid the performance of their duties, must watch over them, and their claims and demands must be subject to his examination and control.

4. Problem of Builder.

With the beginning of the practical duties of the architect, the work enters a new phase, has passed under the superintendent of construction, and by his knowledge of business, of expedients in each branch of his calling, he is to aid the architect in his comprehensive and difficult problem. he supplies the best materials for the work, prepares this in workshops and at the building, combines it according to directions and rules, arranges the labor as most rational and preferable, and erects the building rapidly and in a masterly manner.

We enter here the domain of the superintendent of construction, not to diminish it, but to fix its limits and protect the creative realm of the architect from encroachment. Each has a broad and fruitful field; the trades to the superintendent and arts to the architect. Each should be content with his own and not encroach upon another. The limits of each domain are so extensive, that human life does not suffice to exhaust them. The entire energy and intelligence of the one are due to the increased requirements of his calling, and the entire talents of the other to truly solve the high problems of his art. Even in works of lesser importance, the master of trades and the master of arts should work together.

5. Division of Architectural Labor.

The power of invention acts together with the creative force of thought; thus the purely artistic labor of the architect differs from his scientific duties as a constructor. A division of labor is possible in many cases, and even to be desired, although union in the same person with

mastery of science and knowledge is possible. It is always necessary for the architect to also, be a constructor; but is not required for the constructor to be an architect as well. For the former is the realm of judgement; for the latter is the demain of creative imagination, or as in the motto of the beginning of this division; for one is the prose, and for the other the poetry of the art.

6. Designing.

To enter the domain of architecture, comprised in the last division of this handbook, we have decided to accompany the architect to the end of his problem, which is the embodiment of the design made by him. We have therefore followed his work from the primary requirements and its first conception; have passed over the broad domain of his creation and his labors to build up a clear idea of the branches, to which all other trainign converges, the design, plan, and arrangement of the building. The important may be briefly summarized.

The plan of a building appears in the design, and in order to design a building, one must be a master of construction and a master of form.

To me a master of construction means:--

1. An acquaintance with nature and properties of building materials, and a correct knowledge of statics, to compose elementary structures and to combine them into rational systems and useful members of an architectural organism.

2. Possession of ripe experience, to pay due regard in construction to technics of trades and requirements of mode of execution.

3. Addition to this knowledge of whatever may be necessary to make effect of exposure to weather least, and to conform the building to requirements of sanitary science.

These branches must be assumed as known in designing and planning buildings. He must also satisfy the second condition and be a master of form, which signifies:--

1. Innate talent and an active mind, with an earnest impulse to create sublime and beautiful things.

2. Accurate knowledge of masterpieces of art, grasping the meaning of their forms, and fathoming the nature of architecture, to be equal to its problems.

Ripe judgement and self-knowledge, to be able to embody the creations of his imagination in accordance with the unchangeable laws of architecture.

Where may the architect find art forms more beautifully and completely developed than in the best architectural periods? Where may the desigg and construction of monuments be better studied, than in the styles of

great periods? These branches of training are therefore assumed. In designing and planning buildings, we have only to apply these primary branches and to draw our conclusions.

Whoever has made all these branches of science and art his intellectual property and has grasped the requirements of the problem, derived from custom, habit and from civilized life, possesses the science and knowledge, whose essence is architectural composition.

Architectural design must also combine truth of thought, beauty of form, and fulfilment of purpose. These are the primary laws, which must first be understood with perfect clearness. Those were succeeded by studies of proportions in architecture, of planning buildings in general and in detail, of treatment of forms of external and internal architecture, and the more or less developed vestibules and corridors of buildings.

7. Science of Building.

This academic essay is now followed by what is briefly designated " Science of Building". This comprises thorough consideration of all kinds of buildings, arranged in divisions, each comprising several sections. The course for each species of building, after a brief glance at its historical development, is that the requirements of the building, its form of plan, treatment and arrangement are investigated and deduced from its purposes and uses, from tradition and the progress of civilization. Typical examples serve as illustrations.

The title expresses limitation to a definite creative field exclusively belonging to the architect. As structures should be classed all extensive works of engineers, bridges and tunnels, hydraulic and harbor works, compared with the works of the architect as corresponding to them, and which must be regarded as suitable objects for the effective development of architecture. Yet for convenience, a division of the work between the architect and the engineer was long since made, and we shall therefore omit structures where conditions of use and suitability do not permit requirements of art to assume control, and those in which technical conditions are to be fulfilled. But all in which artistic force predominates, or is not entirely suppressed, from the smallest problems, content with grace and effect obtained with the most limited means, up to the most important undertakings of art, for whose execution the labor of an entire generation is required, will be subjected to critical consideration, while we study their typical peculiarities.

"Architectural Composition" and "Science of Buildings" necessarily belong together and materially extend each other. We have clearly fixed the ideas of both and have limited their domains. Architectural Compo-

sition is the general and theoretical portion, the Science of Building being the special and practical part.

SECTION 1. GENERAL PRINCIPLES.

By Professor Heinrich Wagner.

8. General.

What is the nature of Architectural Composition, what does it comprise, and where did it originate? We recognize it as the result of knowledge and skill, drawn from experience and collected from the realms of science and art. But to find its origin, we must penetrate more deeply. For a proper answer to these questions, we must return to primary ideas.

To compose or design, one must first know what he would create. This is to have an idea, and this idea or mental image of the object is brought out in full clearness and representation by drawings. Architectural designing is therefore a clear representation of a creative thought. Seeking light and clearness, the mind searches for general laws of treatment, infers causes from effects, and reaches a simple ground law, the basis of all, and which prevails in the realm of art, as in that of nature. This is the eternal law of evolution, that primarily exists in creations of the organic world, which the organism calls into existence when conditions for its vitality exist, permitting it to grow and thrive, if each separate organ fulfils its function, when it assumes the form appropriate thereto. Nature takes care that this shape may be truthful and beautiful, if the organism really fulfils its life purpose.

Transferred to the domain of architecture, we have (Art.2) deduced from this the ground law of architectural composition. It starts from that triad of ideas; fulfilment of purpose, truth of thought, and beauty of form, the roots of the tree of theory; it will develop and blossom under the influence of three fructifying forces, experience, science and art. The path to creative activity thus indicated leads through the realm of mental contemplation. But we must still limit ourselves and make prominent the chief points, which architectural design must keep in mind.

Chapter 1. Suitability and Durability.

The requirements of civilized life increase the problems of architecture infinitely, since progressive development and improvement of external and internal conditions of life produce needs of all kinds, which cause new creations in architecture, always with the impress of time. These needs of life are subject to perpetual change and are also the conditions of existence of the building; civilization is the fruitful field of its development. But its germ lies in the purpose; the impetus toward

evolution comes from its innate law of development. From this may be deduced all requirements for works of architecture, which make themselves known in two directions. In most problems, we must satisfy material and esthetic purposes. What do these requirements comprise, that the building may suit its purpose most perfectly, and that it may take part in the improving and ennobling of life and in the welfare of man?

8. Suitability.

Fulfilment of Requirements for Space.

The material purpose is first expressed in suitability of the work. This comprises the space requirements of the problem, that the number and dimensions of the rooms may satisfy the conditions prescribed for the building by its purpose, that their order and arrangement may suit their uses, and that the entire structure shall accord with the customs and taste of the period. These elements of the problem influence the interior organism of the building. Its purpose and its rank among the creations to which it belongs are factors, according to which its organism and essentials are developed, and the magnitude of the building and the proportion of its parts are determined. On these will likewise depend whether all parts and rooms of the building fulfil their purposes, naturally diverse. According to their uses, the apartments in a building may be divided into two groups:--

1. Rooms for common use and for passage, more or less developed in all classes of buildings, and therefore treated in a general way in the oast Section of this volume.

2. Rooms for special uses, which result from the purpose of the building, and which can only be treated in considering the different kinds of buildings.

The entire design must be organically developed from within outwards. This will occur and the building be appropriate, when each portion of the building and each room is in its proper place, when all conveniences are arranged suitably for use, in reference to each other, to the corridors and passages of the building, and to the entrances, vestibules and connecting halls, when the latter are distinct, clear, easily found, and arranged for convenient passage. The more important and imposing a room may be, the more prominent its place in the plan, and its place is to be indicated and emphasized on the exterior. The less important rooms will have to recede in the design for the order and unity of the whole, and will be sacrificed or subordinated to the more important and larger ones. Size and form primarily depend upon purpose, and secondly on esthetic considerations.

10. Building Site, Soil, and Surroundings.

With fulfilment of purpose is connected a proper choice and utilization of building site, as well as a consideration of local conditions. Not every site, nor every soil suits any building; it is important whether a building stands o a mountain or in a valley, in an open area or a narrow street, whether it is under the radiant sunshine or in the shady forest gloom. What would a Greek temple become in place of a Gothic cathedral? Why should an outlook tower be placed on the plain or a monument of victory on the market place? The palm does not grow where the oak thrives, nor the fir in the place graced by the laurel! As a plant thrives in a small unfavorable spot under proper treatment, recieving the necessary energy from circumstances favoring its development, so rises a well arranged building on a limited and unsuitable site, if the location and form of the site, the nature of the soil, and all other local conditions of the problem are fully utilized.

These points are likewise essential in the subdivision of a building, but also appear prominent externally, id the designer knows how to deduce from such restricting influences the idea of a work with characteristic treatment, adjusting the effect of masses of the building, proportions and dimensions of different parts, and the forms of members of the structure, to the site and its peculiarities. The same object will appear quite differently against the open horizon or clear sky, than before a dark background of deep green trees, the outline being more sharply prominent in the former case, the masses seeming reduced and the eye being more sensitive to slight defects in form, than in the latter case. We likewise know that the perspective image differs in height and depth and that we see things otherwise than they really are, the eye being subject to certain deceptions, to be neutralized by pleasing treatment of form. Observation of these phenomena led in the earliest times, especially in the best architectural periods, to a refinement and perfection of form, worthy of earnest study. In the creations of the present time, we apply the same laws, which the greatest masters of past art periods employed, and which we have recognized in their works

11. Sanitary Requirements.

Creations in architecture are intended for the uses of life and for the exelevation of mankind. Their purpose requires that disturbing and injurious influences of climate and country, and that unfavorable conditions at the locality be remedied and in future controlled. These sanitary requirements first comprise measured for protecting the building from such influences. These are expressed in design and arrangement of

the building, in its location, and in precautions for protection from heat of summer and cold of winter, from sunshine and from darkness of night, from penetration of rain and shock of wind. We shelter ourselves from the elements by defenses against the weather, by arrangements for quick removal of rain water from the building to prevent dampness, and from injurious evaporation, by improving neglected grounds and preventing future uncleanness.

These precautions against external influences are also in the most intimate relation to the study of the building and the elements required for life, such as light and air, heat and water. They comprise those innumerable details in the plans of the building required by safety of the health of mankind, and which increase his physical and mental well-being. They do not belong exclusively to sanitary science, but especially to the problem of architecture. They make themselves felt in the sketch for a building, for sanitary requirements are not alone expressed in the elevation and internal arrangement of the house; they especially appear in general design and construction. If the entire organism be unhealthy, the evil cannot be removed by internal and limited means.

It is therefore first necessary to see that the building is placed on a healthy site, is built of good durable and weatherproof materials, and that it be properly orientated and sheltered from prevailing winds. Walls should be of such thickness, the roof so arranged and constructed, as to afford security against destructive effects of the elements. Drainage of the building and protection from dampness are required, walls and partitions must have openings for passage and free admission of light and air. The roof is a protection from rain and sun and should have such inclination and projection, and openings in external walls should be so protected, that rain water may be kept away from the building. In hot countries, one should be protected from dazzling light and scorching heat in lofty and airy rooms, shaded portions, in cold countries having rooms of less height, easily warmed, with closely fitted and cold resisting construction.

12. Requirement of Comfort.

These are primary requisitesfor a healthy building, and must appear in the plans. If to these be added provision for the well-being and convenience of man, for the pleasure and enjoyment of life, embodying the results of progressive science and technical skill, then is the material purpose of the problem completely fulfilled. Man's unremitting endeavor to improve his existence and for freedom from limiting external conditions is satisfied. In this is the nature of man's activity in civiliza-

tion, the aim of his endeavor and toil. To this xxxx,xthemust correspond the building erected with regard and full knowledge thereof.

b. Durability.

13. Duration of Building.

Not only for the welfare of man must his work exhibit a sound structural organism, but it must have sufficient resistance to guarantee security against destruction by natural accidents, by time, and even by man. This is necessary for the building to fulfil its purpose satisfactorily. It must often be devised to endure for generations, for centuries, even for thousands of years, transmitted as a legacy to future ages, and useful to them. This gives another law for the creations of architecture, that of durability. Durability is also based on a requirement of feeling; for, in opposition to the transitory nature of earthly existence, it arouses a consciousness of duration, approximates the hopes innate in mankind, a desire for the unchangeable and the eternal.

14. Building Materials and Construction.

No detailed statement of what is understood by durability is required. This demands intelligent examination and choice of materialsm both for endurance of weather, and resistance to accidental stresses. It consists in the proper use of materials in construction, in the formation of structural elements, and in the union of all parts of the structure in a properly formed building, treated in accordance with statical laws. As an essential factor materials and construction must be taken into consideration beforehand.

15. Magnitude.

Durability requires that magnitude for stability and resistance, which according to rules of science suffices for stresses, and in most cases surplus of strength to satisfy our instinctive feeling for security of the structure, against external influences and the effect of internal forces. Stability and Durability are therefore inseparable from the idea of magnitude. The structure must not only be actually stable, but must appear so; we wish primarily to see it in condition to permanently resist all destructive influences, and uncoditionally durable. Greater strength and magnitude are therefore usually required, than are prescribed by statical calculations, and are necessary, when structures for permanent use are concerned; so much the more essential, when these are works of high importance and cost, creations of monumental architecture, which must possess these characteristics in a high degree.

16. Dimensions of Rooms.

This innate feeling is justified by experience, but has also been trans-

mitted by tradition. A brief review of the architecture of the past will convince us of this, as its monuments are most infallible evidence. They show how in earlier generations were influenced by this feeling and how they expressed it. They also exhibit another element of architectural composition, in the most intimate relation to magnitude, which is the dimensions of rooms, which may here be considered. We must make our conclusions evident by contrasting suitable typical buildings of the most important periods, noting those monuments only characteristic in respect to the questions discussed.

We first mention the pyramids of Egypt, whose sublime effect depends almost solely upon their dimensions and magnitude, though partly on the building material. We glance at their temples, which in addition to other architectural elements, especially astonish us by the apparently eternal duration of their great masses of building and by the simplicity of their construction and their majestic repose.

How entirely different does the Greek temple appear! Material and magnitude are most effectively employed and we also recieve an impresssion of enduring strength; nothing unsafe or transitory is in the appearance of the skillful structure, enthroned above its surroundings in noble repose. But the mass of this monument is even in its least details the consistent result of a structural principle, carried out clearly and masterfully with full knowledge, the system of horizontal ceilings, which according to the law of gravity can exert only vertical pressures. The Greek temple is effective by its magnitude, much more so by clearness and truth of the creative idea, and by the beauty and perfection of its form.

How different again are the not less important masterpieces of Roman architecture! The less perfect form is intended for pomp and show, and construction is not brought to full and true expression. Architectural details borrowed from the Greeks were changed; supporting members are smaller, columns are more slender, and intercoluminations are wider. But another system of construction is capable of the highest development and appears repeatedly. The arch and solid concrete vaults determine the subdivision and the magnitudes of masses of the building; the structure in several stories is evolved. The element of magnitude appears with imposing and overpowering effect, and characterizes the mighty buildings of the Romans who did not avoid many sacrifices to produce this important element of architectural composition.

In the creations of mediaeval architecture, especially in its highest bloom, the feeling for stability and magnitude is expressed in a very different way. The feeling for magnitude did not really exist. The struct-

ure is concentrated in strong and richly-treated wall piers and buttresses, with dimensions in accordance with the system of vaults; but with these are arranged thin enclosing walls and maximum area of window surface; over the splendid and spacious interior extends a vault, where arch rests upon arch, and rib upon rib to transmit the thrust to fixed points of support. But the entire system requires flying buttresses, arches, and structural parts to be stable; it is often highly ingenious and perfect in form, though not intended for eternal duration and immovable resistance, therefore has a somewhat disquieting effect, since mass is lacking. But the feeling for grandeur and longing for the infinite produces its mightiest and most ennobling effect in the loftiest monument for the worship of the Diety, the heaven-aspiring dome. This appears even larger and higher than it really is, by stone masonry in thin courses, by mysterious subdivision of surfaces and masses of the building, and the skilful treatment of the ornament.

We come to the architecture of the Renaissance and modern period, which may be treated together. For the same path has been pursued since the Reformation. Much that is grand and noble has been created, skillful science and high knowledge have been developed; but these art periodshave produced no really new system of construction, except iron and steel construction of recent period, based more on material than on system. Yet in this domain very important things have been accomplished in most recent years. The Engineer, produced by our ancient guilds, led the way in this direction by taking the principle of truth as his sole guide. Yet his science is still too young, and necessary time was not allowed him to devise beautiful forms for his works and thereby create with a useful science a beautiful art. We are in the midst of this movement and cannot anticipate it. But a present tendency concerns us, one towards the most rational and economical use of material and labor and minimum dimensions of the building, resulting from force of circumstances. We must take this into account, and cannot employ magnitude and grandeur to the extent permitted to artists in earlier periods of art, and must free ourselves from this desire, based only on tradition and not on nature of building material. We shall derive benefit from past masterpieces, but must not exchange intellectual freshness and susceptibility to present requirements, for the sublime and beautiful created in the past. And if Architecture primarily consists of results of experience and tradition for thousand of years, Science has a valid claim to joint possession, and must come to the aid of experience, and theory to bhe help of practice. Durability depends upon material, dimensions, and construction, and the general effect is in an intimate

relation to it. Both must suit the purpose and importance of the building.

Architectural composition puts these elements to varied uses; they characterize representations of the building, both of interior and exterior. An essential sign of durability or stability is direct and visible support, of all parts of the building by firm and resisting masses, avoiding all suspended portions of the structure, arranging supports beneath supports and openings above openings. How far our instinct to make supporting parts stronger and more massive than there supported, and lower openings smaller than upper ones may take this into account, must be left to other sections of this work. But it is certain disquiet oppresses us, when piers stand over openings, and heavy masses of walls load slender iron columns. These are endurable if the supporting system is clearly indicated and well defined, if the slender iron construction is inserted in the massive stone structure and arranged independently of stone forms. Late architecture thus produced very satisfactory works.

Under all circumstances, the use of a clear system of construction is essential. The simplest structures are naturally the most durable and pleasing even in our era, which has progressed so far in technical matters. Bold constructions require at certain points stronger supporting masses, even if they do not produce a feeling of insecurity. To effectively embody a system of construction opens a wide field of activity to architectural creation. This is in subdivision of masses, fixing dimensions according to statical laws for transmission of forces to walls and piers, as well as with a uniform distribution of pressure on foundations.

Parts exposed to external injuries must have greater dimensions than protected portions. According to purpose and importance of building, dimensions are to be limited to the minimum, or correspondingly increased. Strict utilitarian buildings and those for merely temporary purposes, are made as simple or as light as possible, and those intended for longer duration are to be strong and more durable. Mass and size are indispensable to monumental buildings, even if they do not alone suffice to make the structure an art work. They are expressed in details as well as in general. If the building is to have both a material and an ideal purpose, and is to be very durable, it should not be reduced to man and the brief life alloted to him. Its parts and the entire structure must be arranged on a larger scale.

Building material is to be selected accordingly, not only with reference to its resistance, but also for its massiveness, depending on its nature and origin. Wood is more exposed to rapid destruction, especially by fire, and must be considered a more perishable material than stone. Iron is

subject to rust, and we do not yet know its durability. Monoliths and ashlars of great size make an impression of resistance and eternal duration. Smaller stones cause parts composed of them to appear larger than in reality. In determining proportionate dimensions, the actual dimension is not to be confounded with the apparent size, produced by architectural members, subdivision and result of art.

Chapter 2. Truth and Order.

The preceding treats all requirements of the building to be directly deduced from its purpose, and thus connected with practical aims of life. But problems of architecture also comprise ideal aims, and these have been touched upon, since both are connected. The law of durability favors the transition; by the construction it belongs to the realm of science, and so far as based on instinct for magnitude and size, to the domain of art also.

a. Truth.

The entire province of knowledge and science is dominated by the idea of truth. For architecture requires truth in the fulfilment of purpose and truth in the expression of the construction. Both must be characterized in the shape, form and even in the least details of the structure. This means that truth must not be concealed, but must everywhere appear.

17. Sincerity in Fulfilment of Purpose.

This consists in the arrangement of the building and in the combination of its parts into an appropriate organism, and also in the characteristic form by which its importance is expressed. For truth appears in the character of the work; true originality depends thereon. Unfortunately in architecture, truth is usually under constraint, and both monotony and elaboration frequently manifest insincerity, indolence, and unfitness. It is without purpose and therefore untrue and faulty to arrange windows and doorways in misplaced order and symmetry on the exterior, where out of place in the interior, to project buttresses from walls with nothing to support, to employ columns and pilasters to support nothing or without meaning. Yet these are by many esteemed beautiful and essential! It is no less injudicious and false to treat the facade of a hall like that of a dwelling, to subdivide it into stories with several rows of windows, to give a block of small houses the appearance of a grand palatial structure, or to suppress division into stories as much as possible, permitting columns or pilasters to extend through several stories.

This does not condemn clear grouping of the masses in a block of buildings, where series of small residences recieve united and effectual architectural treatment, each single house making itself evident, but blames

poverty of invention and monotony in architecture, long bare facades, where feeling is absorbed by visible absence of thought. Free scope is afforded to the imagination, so far as it does not degenerate in the grouping and subdivision, especially in extensive buildings. Thus in a mercantile building, where pomp and show are appropriate, it is entirely proper to combine two stories externally, internally connected as business offices, to secure larger windows for objects for exhibition, thereby serving the purpose of the building, at the same time expressing its intention.

We must adhere to this in architectural creations, and will attain this if we devote ourselves to truth and not to appearance, if we state that the window serves for light and the door for passage, not for appearance, that the cornice is a protection from rain, and is not a decoration for the ceiling of the interior, that the columns are supporting parts of the structure, and not merely ornamental like a decorative frieze; in brief, if we see that each part must fulfil a definite purpose and recieve an appropriate form. We shall succeed if we arrange rooms in accordance with their purposes and importance, group less important ones, accent the chief apartments by projections, by greater height and by more noble forms. The great should not be minimized, and the small should not be made to appear great; unity must not be divided, and separate parts should not be united beneath a single roof. By such tokens is truth recognized in fulfilment of purpose. How is it expressed in construction?

18. Truth in Construction.

A characteristic of truth is that by the most diverse paths the same end is attained. If the same principle appears in the different methods of construction in architecture in preceding ages for giving form to its ideas, we recognize in it the principle of truth. We find in the best periods of architecture that the construction is expressed in its masterpieces equally with their purpose. If we sometimes meet with styles or structures where form is not in harmony with the construction, it is easy to distinguish the true from the false. We shall not take stone imitations of wooden structures in Asia Minor as models, but we must regard wise and consistent use of the material used and the system as characteristic, like the excellent systems of construction in Grecian, Roman, and Gothic architecture.

In Grecian architecture with its horizontal ceiling of stone beams, constructed of large blocks and slabs, statics assumes its simplest form in the law of gravity; rigid concrete vaults in Roman Architecture like inverted monoliths, exert no thrust; but we find in Gothic architecture generally a structure of ribbed vaults, transverse arches and arcades, com-

posed of small cut stones, where all individual stresses are equilibrated and individualized in the various parts of the construction, from which no single piece may be taken without injury. Whenever stone is used, joints and bonds are to be clearly shown, and where wood or iron is the material joints, connections, and system must be apparent. Just this makes the simple and peculiar wooden construction of mountainous regions so effective and so satisfactory. It is the same with much of our iron construction, satisfactory at the first glance in spite of its lightness; truth being expressed in the construction. Falsehood is a vice in mankind and a vice in art also.

We meet the same principle of truth everywhere, though methods differ with results to be obtained, means at our disposal, and obstacles to be surmounted. It also happens that in retaining this elementary principle, methods must be chosen according to circumstances, and these lead to results externally quite diverse. It is first to be understood, form and shape being devised later. The latter must be brought out clearly and truly, with an easily understood system of construction, which conceals or deforms nothing, but appears openly with dignity, lending to the structure life and importance, while treating the different parts in accordance with their functions.

19. Truth in Materials.

But the structural system is based on the materials. We do not describe how to build in stone, wood, or iron, nor how to determine dimensions and treat forms. Truth in construction must appear in a natural use of the building materials, which consists in having each material appear what it really is. Away with all peurile deceptions, where stone forms are imitated in wood, or metal, marble, and other costly materials are replaced by paper and paint! With false trifles and frippery, meaningless and therefore untrue! Yet rational use of a substitute material is not excluded, since even this by skill and treatment may be used in an appropriate way.

20. Degeneration.

Truth in art, as in life, may be carried too far. Great candor and sincerity frequently cause offence and are less appropriate than reticence. This is true in architecture also. Truth must not become oppressive or degenerate into rudeness and lead to exaggeration, opposed to the feeling for beauty.

b. Order.

The supreme general law in nature is order, and this is true in art and science. T Research otherwise loses its starting point and the imagina-

tion is bewildered; truth and beauty are connected, and harmony is based upon it. It is therefore indispensable in art and belongs to the laws of architectural invention.

21. Symmetry and Balance.

The plan of the building may be symmetrical or unsymetrical; order does not signify absolute similarity, but balance of masses of the building and of its members about a central point, or an axis through the centre of gravity of the design. Not strict mathematical symmetry but balance will be adopted as a guide in architectural composition. We do not undervalue symmetry or throw it aside; rightly understood, it is even more essential to order in art than in nature. Just as this never attains absolute sway over forms in nature, in the inorganic or organic world, we may not subject to it the creations of art without limitation. A crystal, leaf, flower, or fruit, exhibits two approximately symmetrical halves, but this is not true of the rock, twig, or tree, Even in more highly developed objects, especially in man, the completest work in nature, we find symmetry in the external form with reference to the axis of the head, but not in the internal organism. What is observed in nature may also be applied to art.

Therefore, the higher the rank assumed by the building, the more may we require order and symmetry, or similarity of its parts about a center, or a chief axis, and under some circumstances, of its side elevations t about a transverse axis. The organism may show variations, especially in the interior; important portions of the entire structure, like the human body, may be symmetrically arranged without requiring perfect similarity. According to the importance of the building, location will be so chosen that its arrangement may not be restricted on either side. It is otherwise for buildings of lower rank, usually limited to a fixed site. Buildings for utilitarian purposes and those for the material requirements of life must be adapted in treatment to local conditions, like creations in the mineral and vegetable kingdoms, and symmetry is usually sacrificed to suitability and truth. The same occurs in buildings erected only on particular sites, to be harmonized with their surroundings. The different parts are then naturally arranged with reference to each other, according to location and purpose, freely grouped without restraint, or within a given space as if crystallized about a centre. One then seeks to symmetrically arrange each portion of a building like the separate crystals of a stone or the flowers of a plant, only so far as its purpose thereby suffers no injury.

The like occurs in the masterpieces of architecture. Very frequently

is the assertion made, that rigid symmetry rules in Grecian and Roman architecture, while in Gothic architecture only freely grouped and irregular designs occurr. The first may be because only the monumental buildings of the Greeks are preserved, and the symmetrical arrangement is nobbler and more suitable for these as already explained. Yet Greece transmitted to us in the Erechtheum a very characteristic and beautiful building, consisting of a triple structure, a double temple and a caryatid porch; neither part is symmetrically arranged about an axis, but in the general design and in accordance with local conditions, they are grouped with the utmost freedom and picturesqueness and are executed with the most refined artistic feeling. In reference to the second statement, we find that the principal monument of mediaeval architecture, the Gothic cathedral, is usually symmetrically arranged about a central axis with a departure from legitimate symmetry in details only, in ommission of annexes, towers, etc., on one side, where not necessary.

From this it follows that to require rigid symmetry in many designs for buildings, would be a fault, as it would frequently transgress laws of suitability and truth. This is the case in buildings with different parts varying according to their purpose and importance, in length and breadth, and in number and height of stories. How, if at a nobleman's seat or country house the principal salon were balanced by the kitchens, the conservatory was like the stables, and the chapel was similar to the chambers and living rooms, each of equal height and symmetrically treated, so that their uses could not be externally distinguished? This would be monstrous; not only monotonous in the extreme, but deceptive and false, whether intended to ennoble the building or reduce everything to a lower level. One is perhaps suprised by such contradictions and considers them impossible; similar things are actually found in many palaces externally decorated by the orders, and are almost invariably regarded as proper and beautiful!

From these examples, easily increased in number, three things are evident: that especially in monumental buildings, symmetry may be omitted only for a definite reason; that when this occurs, one should not be discouraged thereby but should never for the sake of symmetry have recourse to absurdities like blind doors and windows; so far as possible, each separate part of the building should be symmetrical, whether the general arrangement be regular or irregular. But this must in all cases be natural; neither regularity not irregularity may be artificial or cumpolsory, or degenerate into disorder and wildness.

22. Architectural Orders.

This means order in architecture, with which must not be confounded the

Architectural Orders. They were originally evolved in an organic way; from the Grecian temple the Order cannot be removed from the Greek temple, for its Order is its style. Just as little as may one of its members be omitted, as for an insect or a flower, without destorying it; in both cases each part fulfils a function assigned to it in the general organism and exhibits a form adapted thereto. But there is something else in the Order on a Roman building; it is merely decorative and may be removed and transferred at pleasure or be replaced by something different, as the construction of the building is not thereby changed. Since the revival of antique architecture has so proceeded, that without strict purism one may justly say that order has by the Orders become disorder, that these serve as falsities. They are only justifiable when columns or piliars have a statical function or at least a certain importance, and their existence is h based upon the arrangement of the interior.

23. Unity.

In architectural design, order is shown in the arrangement of the building. We proceed from the inmost nucleus, from the heart of the plan, to develop the internal organism and to clothe the skeleton of the structure, to connect the parts, accenting the chief portions and making them prominent by form, subdivision and ornament. This method leads to the united organism and to unity in architecture. For in this way is made apparent the relation of architectural members, which seperately possess no importance, and the unity of all parts, that one may not have a loose collection of accidentally joined parts, but an indivisable whole. Unity is based on order, but unity and harmony rule the realm of the beautiful, that innermost domain of art.

Chapter 3. Beauty and Ornament.

The idea of beauty is the highest law of architectural composition. In what directions must creation proceed to produce beauty? What belongs to each part, that the work of the architect may be beautiful? To answer these questions and fix the conception of beauty, we must again compare phenomena in nature to phenomena in art.

a. Beauty.

24. Conception of Beauty.

The idea in common life, when we speak of the beauty of a thing, varies according to the rank the object occupies in creation. We may indeed term any object created by nature beautiful in its way, since it is externally perfect; yet we justly call products of the inorganic and organic world beautiful, since they are distinguished above others of their kind, and the more fully one of these is endowed by nature, the higher is it placed,

and the greater are our requirements. Thus the crystal by its simple and regular form, by color, lustre, and behavior toward light, and the flower by its form, by the magnificence and blending of color tones, by its fragrance, and even by its organic life, produce animated and pleasant impressions. If we take the higher forms of nature, or the highest product of creation for comparison, we find perfect beauty in mankind, not only the highest example of completeness in external appearance, but the impress of his spirit, the expression of his spiritual peculiarities, and above all, we find character. A head possessing character will always prove beautiful; but a fine head is not always evidence of a noble character. Possessing the latter, one will be guided by ideas of morality and truth in all situations in life, and both are combined in the idea of beauty.

25. Architectural Style.

As with phenomena in life, so with phenomena in art; but as character is to man's life, so is style to the domain of art. Style is just as essential to beauty in art, as character to beauty in life. For style is the imprint of art processes by which creation takes form in accordance with the nature of the material treated and with the ideas of the time; or, as expressed in Semper's words; " Style is the harmonizing of art phenomena with the history of its origin, and with all the requirements and the circumstances of its existence".

Let us hear the same master in regard to the origin of architectural styles: "The ancient monuments are rightly designated as fossil shells of vanished social organisms; but they did not grow on the backs of these while they existed; nor did they shoot forth in the hidden processes of nature like coral reefs, but they are constrained works of man, who has employed on them his inderstanding, observation of nature, genius, will, desires, and powers. The free will of the creative spirit of mankind therefore enters as the most important factor into the question of the origin of architectural style, and this must indeed in his creations move within certain higher laws of tradition, of requirements, and of necessity, but it adopts this by its fine perception and realization and makes it useful. Wherever a new idea of civilization took root and was accepted as such in the general consciousness, this found architecture at its service to determine its monumental expression. Its mighty civilizing influence is always recognized, and its works were with assured purpose impressed with that stamp, which elevated them as symbols of the prevailing religious, social and political systems. Not from the architects, but rather from great regenerators of society proceeded this new impulse, when the right hour had sounded for this ".

A new architectural style is only produced by a new view of the world, the gift of a new epoch of civilization, whose world-moving idea may even be nature. Since we are on the ground created by the aqquisitions of the Renaissance, we enter completely into the inheritance of that great period, when we truly make it our own, both in science as well as art, by developing it in accordance with requirements and conditions of modern civilized life. From this will the true and beautiful architectural style of our time be derived. It also follows that all our thought must be directed to spontaneous architectural creation, and all our abilities be exerted, to contribute our own work for this high purpose. The power of the architectural profession does not suffice, while the energy and will of individuals are lacking. But scattered labor is most injurious, and it is a delusion to believe that decoration by the old can equal the invention of new ideas, or that periods without styles may be revived.

Architectural style requires a clear system of construction by our statements and all traditions. Yet this does not itself form a style although an important element. The same structural principle may be developed in different directions and form the bases of different styles. The present does not need to await an epoch-making invention of a new system of construction, as if creation of a new style were dependent thereon. Other impulses are explained in Semper's words and actually produce it. Like other elements of architecture, style depends on the building material. One may properly speak of a wooden style, a brick style, an iron style, etc., because in each of these the respective building material is indicated, since the style assumes a special character in accordance with it.

28. Building Material.

The building material is itself an effective element of beauty by the characteristics of its external appearance. Granite and syenite, by indestructibility of their nature, color and polish, cannot be replaced in monumental architecture by other materials, any more than marble, with the delicacy of its tones, its veining and its texture. Sandstone is distinguished by its dull tone, appropriate for external architecture; clay is notable for plasticity and suitability for all purposes, in plain bricks in masonry and in terra cotta and majolica for relief and color decoration. Wood has an excellent effect as internal finish by diversity of grain and color, by its capacity for polish, and by suitability for carving. Iron assumes in the mould and under the hammer the most varied artistic forms; bronze takes the highest development in form under the tool of the chaser, one not obtained in any other material, and acquires a beautiful patina, suprising in antique bronzes. Finally should be mentioned stucco as and

be beautiful and may appear ugly in connection with another, the converse being also true. It is quite the same as in music. One tone is in itself no more beautiful than any other; its full effect only appears when joined with others in chords, melodies and musical works. Rhythm and harmony are also required in architecture; as in musical or color tones, a form is only effective by combination or contrast with others. The use of successive novel forms has a disquieting and bewildering effect, while repetition of similar motives in rhythmical sequence is quiet and animating; though if these too frequently occur, they become exhausting and monotonous.

29. Subdivision.

This is true of formal treatment in general and in detail, the subdivision of the form, by which its beauty is increased or diminished. Subdivision must be arranged in accordance with the character of the building; simple or rich, graceful or severe, grave or gay, according to the purpose of the structure and to other circumstances. To heighten the effect, the animated and subdivided portions must be relieved by plain and undivided surfaces, a certain accenting must be employed with a certain rhythm of lines, that the correct relation between masses and openings may be retained. Harmony is again required; it is the feeling of solidity, durability, and order that fixes the requirements to which due attention must be paid in subdivision.

The treatment of the members in detail will thus be subordinated to the general subdivision, and is to be adjusted in accordance with the character of the building. This extends to the forms of structural parts of the constructive organism, and makes apparent the structural importance of the parts of the building. We cannot here neglect characteristic art forms determined by the architectural style. The necessity for resisting the same external influences and the same internal forces, and the requirement of making this conflict apparent to the eye, has produced similar lines and forms in the most diverse periods and localities. As we make known our thoughts by tones and words, so do we in architecture express our designs in lines and forms. We therefore take these forms from those originated by innate feelings of mankind, that they may be apparent and be understood in the simplest and most natural way. We can also consider, with slight exceptions, that these are just as much fixed as are forms based on the laws of nature.

30. Mouldings and Profiles.

Such forms are mouldings and such lines are profiles. They are partly composed of geometrical lines and are partly free hand. We do not designate these architectural members according to their functions. They may represent transmission of a load, a free termination, or union or separa-

tion of structural parts, and curves of varied curvature, convex and concave, some bold and heavy, others delicate and graceful, alternate with angular and straight forms; the more closely these lines approximate straight lines, the more energetic should be their sweep, and beauty of form is based on well arranged graduation, on change of movement, and on the effect of light and shade.

31. Scale.

Subdivision in general and in detail is to be designed on a single scale, not based on an absolute, but a relative unit of measure, which depends on the purpose and importance of the building. Thus we properly speak of the scale of a building, and where this does not exist, of the lack of a uniform scale. Harmony occurs in Grecian architecture instead of a scale, or not quite symmetry, but harmony of the whole with its separate parts, which appears in the nearly identical ratios of the lower diameter of the column to the building, to its principal parts, and to the architectural members. The modulus replaces the scale, for it has no relation to the dimensions of the monument. Whether the temple be small or large, its proportions remain about the same, and as actually fixed by artistic invention and not by the object itself. But for the vast monuments of the Romans and especially for the creations of the middle ages, as well as for those of the Renaissance and the modern era, a fixed scale is taken as a basis, which first depends on the height of man, afterwards on the building materials. It is indeed natural to assume this scale, all our buildings being used by men, since windows, doors, balustrades, etc., are in proportion to their height, dimensions being only varied, according to whether intended for merely useful structures or those occupying higher rank and intended for assemblage of many persons.

It is just as erroneous to enlarge the architectural forms of houses and of ordinary buildings to unusual size, as to diminish those of monuments intended for extraordinary purposes, like triumphal arches, baths and theatres. If this be done, the scale and general effect of the building are changed; for it will appear smaller, the larger its scale in proportion to its absolute dimensions, and conversely. To make this evident, compare Cologne Cathedral with the Church of St. Peter at Rome. Who would believe that the latter was two and a half times the area of the former? This may be explained by magnitude of scale and of dimensions; There a narrow five-aisled interior and heaven-aspiring towers are lost in graceful details, suited to the stature of man; here is a spacious interior, decorated by colossal statues, spanned by mighty tunnel vaults with a gigantic dome over the intersection, beneath which men vanish. The Church of St. Peter indeed excels in grandeur

of effect of space, but the Cathedral of Cologne excels in spacious effect of the masses.

32. Proportions.

The greatest influence upon beauty of form and effect of the masses is exerted by these proportions in architecture. They mean the relations of the whole to its separate parts, based on a harmonic system, and they are in intimate connection with the subdivision and the scale, and therefore cannot be transferred to any other object and scale. The Church of St. Peter shows that the proportions may be in themselves correct, but may be relatively faulty. Nature shows this, when it varies the proportions of the human body in accordance with age and sex, the proportions of the head, hand, and foot to the body differ in men from boys, and in women from girls.

Therefore if the proportions of a building may not be arranged in accordance with a rule fixed for all classes, but must be selected according to circumstances, one must not yield to a delusion that they are only determined by our feeling. Sense of proportion is variously developed in men; the eye must be trained to discover defects, just as the ear finds discords. The architecture of past periods supplies us with the means in numerous monuments with model proportions. From their study, we find the proportions of a building to consist of harmonic relations between masses and openings, between flat surfaces and reliefs, and between length, breadth, and height of mass of the structure. These ratios may be expressed in numerical values or in geometrical figures, which afford most valuable data. But we cannot include in the calculation and the drawing the influence of the site, or of the scale and color of the object upon its proportions, and this influence xx xxx xxxx is very important. We must not lose the chief points of view for the problem, or a regard for the harmony of the whole. What would become of art, and what would talent do, if beauty of form could be deduced by formulae? These enable us to subdivide masses and interiors of ungraceful proportions in such a manner that the object may appear removed or lessened, and divisionof the structure or union of its parts may induce beautiful proportions in detail and a harmonious general effect. These indications require explanation, But the evidence, other connected deductions, and discussion of optical effects, must be left to a later part of this volume.

b. Ornament in Form and Color.

Ornament in relief and in color are other elements of architectural composition. These contribute much to the beauty of the building, which might in itself be beautiful without ornament, since it could not attain true beauty with ornament alone.

33. Origin of Decoration in Relief and Color.

Inclination for ornament springs from an innate impulse in men to beautify their existence. Men in the lowest stage of civilization adorn their persons and the work of their hands. From occasional festal decorations of important buildings, originally consisting of natural flowers and fruits, of ornamental vases and trophies, opening later a permanent ornamentation by the aid of art; it became a requirement of art. Imitation of nature produced artificial ornament, either relief ornament in clay, stone, or wood, or applied as colored ornament with brush and color. The elements of relief and painted decoration are in the creations of nature. But it would be an aberration of art to seek to produce an accurate imitation of nature. Each art period has therefore taken nature in its own way, and has sought in representing it by form and color to bring out the ideas of its time in characteristic expression.

34. Ornament.

Ornament undoubtedly belongs to the domain of architecture and is indispensable to its works, preferably obtaining its motives from the vegetable kingdom, though also from the animal kingdom. It is incised in the surface as linear ornament, though this is chiefly executed in color, or is carved as relief decoration in the building material itself, and it is imitated from living forms of nature with more or less freedom. Conventionalization is absolutely essential. For decoration must not sink to a slavish imitation of nature; we must know how to apply it, to modify its type in accordance with the material, to simplify and to conventionalize it. Naturalistic treatment will be less suitable, when the ornament is required to express the character of a quiet surface by a pattern or a strong rhythm. We therefore distinguish between free decorative ornament and structural decoration, the first being purely ornamental, the second expressing the construction. Decorative ornament is a free addition produced by the spontaneous feeling of mankind, whose origin was just described. It contributes to the beauty of the object by animating and decorating plain surfaces and stiff members judiciously, but is not absolutely necessary. Structural ornament proceeds from a less primitive desire of mankind, expressed by making prominent and by adorning the form of the structural part as determined by the style. It therefore extends to the actual members of the architectural organism especially to those, like the shaft of a column, a console, etc., where the conflict of different stresses in the structural system becomes apparent.

Ornament in general, especially free ornament, should in accordance with its origin always personify an idea related to the ideal significance of the building and taken from the phenomena of life and nature. Motives from plants do not suffice; animals must in part supply motives; man himself and

his forms appear in the creative realm of the artistic imagination; animal forms are even invented, formed in accordance with the rules of decoration, but which must have a justification of their existence in an apparent capacity for life. Thoughtful ornament , composed in such a manner, ennobles and animates the work; it affords food for thought; one would not become tired of it, while meaningless ornamentation, even if equally beautiful, would soon become wearisome. It is not said that everything should be covered by allegorical ornament; the more important and effective this is, the more sparingly it is to be applied. Simple rhythmic patterns are appropriate for animating the surface, as well as geometrical frets and bands to enclose it.

Structural ornament contributes to the decoration of architectural members; it has no statical function, but adjusts and lessens the conflict of stresses in architectural members. It should not conceal the leading forms, but allow them to appear in their structural significance, and lend them life and movement. Stone forms naturally prevail here. The formal treatment of every kind of ornament is entirely dependent on material and technical processes.

35. Color.

The influence of color upon architecture must also be considered, even if it be merely accessory, since it is of great importance to the effect of form. It is indeed one of the most effective and most prized elements of architectural composition, both for accenting form in the best manner and for carrying out an independent creative idea. The use of colored decoration on the pictorial imitation of an object is perfectly natural, since color appears in everything in nature, and in building materials form and color can not be separated. Its introduction is therefore justified in the representation of objects from nature and from life. This is true in reference to architecture also, since all architectural styles have obtained a polychromatic effect, partly by materials of different colors, partly by color decoration. Although external polychromy may have been largely employed only by certain nations, yet wider scope has always been accorded to it in the interiors of buildings.

36. Polychromy.

First consider the use of color in the interior, which esthetic feeling has always required. A hall, or even an important room of a building is incomplete while uncolored; color is therefore indispensable to internal architecture; nothing opposes its free development, and the modern period therefore properly makes a most extended use of it. What chiefly concerns the color treatment of the building? How is harmonious effect to be obtained? This requires a developed feeling for color and an earnest study of the polychro-

matic masterpieces of architecture; suggestions are to be taken from nature, to penetrate into the mystery of its splendor of color in the organic and inorganic world, and to derive useful applications from them. We learn that upon contrasts of colors and broken tones, upon those of primary and mixed colors, is based the harmony of colors, and if we investigate the phenomena of nature, we find primary colors prevailing in ordinary natural phenomena and in low forms, but mixed colors in higher forms.

But nature also gives us by a moderate use of its color materials a suggestion for the use of color in architecture. We conclude that a tone derives its value from its surroundings, that pure colors become quiet and harmonious with a broken ground tone, strong and brilliant with light and shade, and that mixed colors alone are monotonous and without light. We note that the latter remove the object further from the eye, the former causing it to appear nearer. These are especially applicable to use of color in the interior, but it is otherwise with the polyghromatic treatment of the external architecture. It is not in the power of the creative artists to exclude all elements, that may produce discord and injure the desired effect. For this depends upon external influences, on sky and sunlight, and on surroundings. A colored facade is like a festal garment, and the building makes a peculiar impression, as a separate decorated object, especially in rain and snow. If harmony, the primary requirement of beauty, occurs, the surroundings must be suited to the key-tone, and at least to a certain extent, polychromy must be applied to the external architecture. When this is done, wise moderation must be exercised, more than in using color in the interior.

For the polyghromatic treatment of the exterior, as well as of the interior of the building, we have the means in natural and artificial building materials of varied colors, and especially in the greatly developed technical processes of the decorative arts. The principal building material or the local color will give the key-tone of the harmony; the chief member will be kept in a quiet and united tone, while stronger colors are permissible for other parts. Veined materials of varied colors are effective and suitable for small enclosed surfaces, flat architecturel members, unfluted shafts, etc., but when employed freely and as subdivisions, they frequently have an unquiet and disturbing effect. Light tones may be used above and dark ones below, especially in the interior, where persons and objects become more prominent before a dark background. For internal color treatment and an especially effective element in very recent years, is stained glass also properly employed

in secular architecture. In no method of coloring are colors more splendid, more beautiful, and more harmonious for interiors. Color is in both nature and art so costly that we fully enjoy its recent advancement among us, and only wish it to completely supplant the dull gray of the last decade, and that a feeling for color may more strongly affect mankind.

37. Painting and Sculpture.

Ornament and color justly belong to architecture by their origin and by use for thousands of years. It also claims the assistance of painting and sculpture, which are suited to impart to its works the highest importance. No monumental building is complete, or can be finished, without these accessories. An indication of high development of art and of the work of a master in all periods, is the assignment to creations of the sister arts the place of honor in buildings. How should architectural composition proceed? How should painting and sculpture in the service of architecture treat their works? These questions suggest further study. We merely indicate the direction from which their answers may be expected.

The architectural work is to be so designed, that it may remain without painting and sculpture, complete and beautiful in itself. It is to be decided as if paintings and sculptures did not exist, or were removed from the places assigned them by the master. He places them in the tympanum, in the frieze, in panels, and in niches, to impart to his work grace and beauty of life by living representations of the beautiful. But the works of the painter and the sculptor must be subordinated to those of the architect; they must not disturb unity and harmony, nor monumental repose of the building, and must be suited to the spaces created for them. Sculptures and paintings must correspond to the intellectual purpose of the building, conform to it in style and scale, and be in complete harmony with it in drawing, relief and color. Thus have the three formative arts wrought together in all ages, contributing to the master works of architecture. Nor will our era fail in this, either in ability or desire.

FINAL CONSIDERATIONS.

38. Application of Preceding Laws.

We have here followed theory; we have seen the tree of knowledge arise from a germ, grow by the impelling force of truth, and blossom under the power of beauty; by its law, we ascribe to the creations of architecture the highest consecration and perfection of art. How is it with the restrictions and the applications of these laws? These are the same

inviolable laws, valid in past great art periods and retained in all ages. They are known, but are also misunderstood. This especially occurs for the principal of truth. It is most commonly opposed in art, exactly as in life. For endeavor to appear otherwise than he is, is founded in the nature of man. Hence appropriateness and even true beauty commonly suffers, not alone in works of special importance. Tendency to deception is the vice of our era, and is deeply rooted; it has penetrated even into the home; we are pleased to decieve ourselves there. Is it not generally stated as a special merit, that stuccor appears to be wood, and wood looks like marble, that a principal cornice, a roof, or an ornament is so made of zinc as to appear exactly like solid stone? And all this is due to the art and brush of the painter!

39. Recent Period.

But error appears in even another direction. The time is not distant, when the perfection of architecture was thought to be the most faithful imitation of an antique building. Structures were copied, whose originals were built many centuries since under another sky, of different materials, for other purposes, and at another scale. What was the result? A so-called architectural style in accordance with the supreme law, which must consist of all possible architectural styles, that the entire history of civilization might be reflected therein, just as our modern civilization is composed of the elements of all earlier civilizations.

40. The Present.

This age has indeed some good points for it has led to more accurate knolwedge. It is now generally understood, that however great he may be, one man cannot create a style. It may be a different and better one, but is still not good. One no longer ~~copies,~~ but composes, though in the most different styles. Architecture is believed to advance, when the style is modified in accordance with fashion. Yesterday Greek or Roman was used, now it is German Renaissance or Barocco, and it will tomorrow be Romanesque or Gothic; Louis XV and perhaps Japanese must be found side by side in the same series of apartments. Whither will this lead in a rapidly living age? Architecture has become merchandise; and adjusts itself to supply and demand. Nearly all styles are now offered; a bit is cut off from this style, one from that one, all drawn from one source under the pressure of fashion! What all earlier ages possessed, which we do not miss in the Rococo, has been lost; unity of

style is lacking. The building is a creation of the age and therefore exhibits the attire of the period.

41. The Future.

What will result from this confusion of style? How is it to be improved, and how may the taste of our era be guided in the right path? Only by holding firmly the unchangeable principles of our ancient art. But all may be truly beautiful and correct in theory, yet by practicing it one can not live. With the best principles one may suffer hunger, for the truth alone does not lead to abundance. Nothing can be opposed to the truth of this argument, so long as owners and the public only desire deception. The remedy is the teaching of better ideas, and by guidance to the straight, though toilsome path of the good, the Beautiful and the True. Who shall transform public conception of the needs of art, other than the artist? What have we done for this? We have complained, suffered, and blamed ourselves and others. We must turn about, for we waste instead of utilizing the power of past art periods; we yield and embrace electism, as it is more convenient to go with the current than swim against it. But we have lost original and spontaneous creation. To acquire facility again, we must commence the work with ourselves. For "Fine art", says Fergusson, " is a hard task-mistress, and to obtain her rewards, men must work, and think, and exercise infinite self-control. False art isan easy, smiling dame, whose favors are readily dispensed, but worthless when obtained". We will lay hand to the work, at the same time speaking for light and truth! Even if the individual cannot do much, the entire profession may accomplish something, a generation so much the more, and that begun today may be continued tomorrow. We hope for success, a s a visible improvement and a purification of art already occurs. All conditions exist for art in fresh bloom, shining forth in the clear sunshine of a new era of beauty. The feeling for architecture has become more active, even if it has sometimes wandered from the path. The public takes a living part in its development; the architectural profession has sacrifice and inspiration and is distinguished by genuine knowledge and skill; artisans are full of energy, ability, and a wide knowledge of all expedients; we command more money than ever before, and better transportation, bringing us near the most distant countries, and while united, ought we to fail in producing art peculiar to our era, escaping from the domain of electicism and of fashion? But it is first necessary that the prevailing misconception of what is good or bad, true or false, beautiful or ugly, should end. And with this aim, we will hold fast our grand principles of arch-